CLAIMS

1. A composition for use in preparing a zinc electrode including:
   (a) A source of zinc capable of existing in an oxidized and a reduced state; and
   (b) At least one compound selected from the group consisting of C_6-C_{30} fatty acids, salts, esters and other derivatives thereof, and C_6-C_{30} alkyl sulfonic acids salts, esters and other derivatives thereof.

2. A composition as claimed in Claim 1 wherein the source of zinc is zinc metal, a zinc salt, zinc oxide, zinc hydroxide, or a mixture thereof.

3. A composition as claimed in Claim 1 wherein the source of zinc is in an oxidized state.

4. A composition as claimed in Claim 1 wherein the source of zinc is a zinc salt, zinc oxide, zinc hydroxide, or a mixture thereof.

5. A composition as claimed in Claim 1 wherein the compound is a C_6-C_{30} fatty acid, salt, ester, or other derivative thereof.

6. A composition as claimed in Claim 1 wherein the compound is a naturally occurring C_{12}-C_{22} fatty acid, salt, ester or other derivative thereof.

7. A composition as claimed in Claim 1 wherein the compound is a naturally occurring C_{16}-C_{20} fatty acid, salt, ester or other derivative thereof.

8. A composition as claimed in Claim 1 wherein the compound is a metal salt of stearate.

9. A composition as claimed in Claim 1 wherein the compound is zinc stearate or calcium stearate.

10. A composition as claimed in Claim 1 wherein the compound is zinc stearate.

11. A composition as claimed in Claim 3 wherein the molar ratio of the compound to the zinc existing in an oxidized state is in the range 0.0001:1.0000 to 0.5:1.0.

12. A composition as claimed in Claim 11 wherein the range is 0.05:1.00 to 0.4:1.0.

13. A composition as claimed in Claim 11 wherein the range is 0.075:1.000 to 0.25:1.00.

14. A composition as claimed in Claim 1 wherein the compound is zinc stearate and the source of zinc is zinc oxide and/or zinc hydroxide.

15. A composition as claimed in Claim 14 wherein the molar ratio of zinc stearate to the source of zinc is in the range 0.0001:1 to 0.5:1.

16. A composition as claimed in Claim 14 wherein the range is 0.05:1 to 0.4:1.

17. A composition as claimed in Claim 14 wherein the range is 0.075:1 to 0.25:1.

18. A composition as claimed in Claim 1 wherein the compound is calcium stearate and the source of zinc is zinc oxide and/or zinc hydroxide.

19. A composition as claimed in Claim 18 wherein the molar ratio of calcium stearate to the source of zinc is in the range 0.0001:1 to 0.2:1.

20. A composition as claimed in Claim 18 wherein the range is 0.01:1 to 0.1:1.

21. A composition as claimed in Claim 18 wherein the range is 0.03:1 to 0.15:1.

22. A composition as claimed in Claim 1 wherein the source of zinc and the compound are in admixture.

23. A composition as claimed in Claim 22 wherein the source of zinc and the compound intimately mixed in the admixture.

24. A composition as claimed in Claim 22 wherein the admixture is formed by

precipitation.

25. A method of preparing a composition for use in preparing a zinc electrode including the steps of:
    1. Preparing a first precipitate of zinc hydroxide;
    2. Mixing a solution of an alkali salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid with a suspension of the first precipitate; and
    3. Adding a solution of a salt of a mineral acid to the mix to provide the composition as a second precipitate;

    wherein the composition is a mixture of zinc oxide and/or zinc hydroxide, and an insoluble salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid.

26. A method as claimed in Claim 25 wherein the first precipitate includes graphite.

27. A method as claimed in Claim 25 wherein the solution of an alkali salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid is saturated with zinc.

28. A method as claimed in Claim 25 wherein the alkali salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid is an alkali salt of a naturally occurring C_{12}-C_{22} fatty acid.

29. A method as claimed in Claim 25 wherein the alkali salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid is an alkali metal salt of stearate.

30. A method as claimed in Claim 25 wherein the alkali salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid is potassium stearate.

31. A method as claimed in Claim 30 wherein the salt of a mineral acid is zinc sulphate.

32. A method as claimed in Claim 30 wherein the composition is a mixture of zinc oxide and/or zinc hydroxide, and zinc stearate.

33. A method as claimed in Claim 32 wherein the molar ratio of zinc stearate to zinc oxide and/or zinc hydroxide is in the range 0.0001:1 to 0.5:1.

34. A method as claimed in Claim 32 wherein the range is 0.05:1 to 0.4:1.

35. A method as claimed in Claim 32 wherein the range is 0.075:1 to 0.25:1.

36. A method as claimed in Claim 32 wherein the salt of a mineral acid is calcium nitrate.

37. A method as claimed in Claim 36 wherein the composition is a mixture of zinc oxide and/or zinc hydroxide, and calcium stearate.

38. A method as claimed in Claim 37 wherein the molar ratio of calcium stearate to zinc oxide and/or zinc hydroxide is in the range 0.0001:1 to 0.2:1.

39. A method as claimed in Claim 37 wherein the range is 0.01:1 to 0.1:1.

40. A method as claimed in Claim 37 wherein the range is 0.03:1 to 0.15:1.

41. A composition prepared by a method as claimed in Claim 25.

42. An electrode comprising a composition as claimed in Claim 1.

43. An electrode comprising a composition as claimed in Claim 41.

44. An electrode as claimed in Claim 42 wherein the composition further comprises an alkali metal hydroxide.

45. An electrode as claimed in Claim 44 wherein the alkali metal hydroxide is present in an amount no less than 0.3g per 0.1 mole zinc oxide/hydroxide.

46. An electrode as claimed in Claim 44 wherein the alkali metal hydroxide is potassium hydroxide.

47. An electrode prepared from a composition as claimed in Claim 1 wherein the electrode is charged.

48. An electrode prepared from a composition as claimed in Claim 41 wherein the electrode is charged.

49. A composition prepared from an electrode as claimed in Claim 47.

50. A composition prepared from an electrode as claimed in Claim 48.

51. A method of preparing an electrode including the steps of:
    1. Mixing solid alkali metal hydroxide with a composition as claimed in Claim 1;
    2. Applying the mix on to a current collector; and
    3. Forming the electrode.

52. A method as claimed in Claim 51 wherein the current collector is woven graphite cloth plated with metallic tin.

53. A method as claimed in Claim 51 wherein the current collector is brass mesh.

54. A method as claimed in Claim 51 wherein the forming the electrode is by applying pressure.

55. A method of preparing an electrode including the steps of:
    1. Mixing solid alkali metal hydroxide with a composition as claimed in Claim 41;
    2. Applying the mix on to a current collector; and
    3. Forming the electrode.

56. A method as claimed in Claim 55 wherein the current collector is woven graphite cloth plated with metallic tin.

57. A method as claimed in Claim 55 wherein the current collector is brass mesh.

58. A method as claimed in Claim 55 wherein the forming the electrode is by applying pressure.

59. A cell comprising at least one electrode as claimed in Claim 42.

60. A cell as claimed in Claim 59 wherein the electrode is an anode.

61. A cell as claimed in Claim 59 further comprising an electrolyte.

62. A cell as claimed in Claim 59 wherein the cell is an alkaline cell.

63. A cell as claimed in Claim 59 further comprising a porous separator located between the electrode and at least one other electrode.

64. A cell as claimed in Claim 63 wherein the separator is a porous separator.

65. A cell as claimed in Claim 63 wherein the porous separator is a woven cloth.

66. A cell as claimed in Claim 63 wherein the porous separator is woven nylon cloth.

67. A cell as claimed in Claim 61 wherein the electrolyte is saturated with zinc oxide.

68. A cell as claimed in Claim 67 wherein the electrolyte is super-saturated.

69. A cell as claimed in Claim 61 wherein the electrolyte is saturated with tetraalkylammonium salt.

70. A cell as claimed in Claim 61 wherein the electrolyte is saturated with tetrabutylammonium salt.

71. A cell as claimed in Claim 61 wherein the accessibility of the electrolyte to the electrode is restricted.

72. A cell as claimed in Claim 61 wherein the electrode is enclosed to restrict access of the electrolyte.

73. A cell as claimed in Claim 61 wherein the electrode is enclosed with nylon cloth.

74. A cell as claimed in Claim 59 wherein the electrode assembly is enclosed with an inert plastic.

75. A cell prepared from the cell as claimed in Claim 59 wherein the cell is charged.

76. A cell as claimed in Claim 59 wherein the cell is a rechargeable cell.

77. A rechargeable cell as claimed in Claim 75 wherein the cell maintains greater than 55% capacity after 350 charge/discharge cycles, at charge and discharge rates such that charge and discharge of the battery are complete within 2-2.5 hours and 1-1.5 hours, respectively.

78. A rechargeable cell as claimed in Claim 76 wherein the cell maintains greater than 80% capacity after 1134 charge/discharge cycles, at charge and discharge rates such that charge and discharge of the battery are complete within 2 hours and 1.7 hours, respectively.

79. A method of preparing a rechargeable cell comprising a zinc electrode wherein;
the cell maintains greater than 55% capacity after 350 charge/discharge cycles, at charge and discharge rates such that charge and discharge of the battery are complete within 2-2.5 hours and 1-1.5 hours, respectively; or
the cell maintains greater than 80% capacity after 1134 charge/discharge cycles, at charge and discharge rates such that charge and discharge of the battery are complete within 2 hours and 1.7 hours, respectively;
including the step of incorporating an insoluble salt of either a C_6-C_{30} fatty acid or a C_6-C_{30} alkyl sulfonic acid in the zinc electrode.

80. A method of preparing an electrolyte super-saturated with zinc oxide including the step of adding nickel and an excess of zinc metal to a solution of zinc oxide.77.A method as claimed in Claim 76 wherein the nickel is added as nickel sponge.

81. A method as claimed in Claim 80 wherein the zinc metal is added as a powder.

82. A method as claimed in Claim 80 wherein the nickel and zinc metal are in

contact.

83. A method as claimed in Claim 80 wherein the nickel contains a platinum group metal.

84. A method as claimed in Claim 80 wherein the nickel contains palladium.

85. A method as claimed in Claim 80 wherein the solution of zinc oxide is prepared by adding an excess of zinc oxide to a solution of alkali metal hydroxide.

86. A method as claimed in Claim 80 wherein the electrolyte contains greater than 47 g/L ZnO at 27°C.

87. An electrolyte prepared by the method as claimed in Claim 80.